Original Article

Prevalence of respiratory diseases in hospitalized patients in Saudi Arabia: A 5 years study 1996-2000

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Abstract:

OBJECTIVES: 1) To determine the prevalence of respiratory diseases and the length of stay among hospitalized patients with respiratory disorders 2) To detect the medical disorders commonly associated with respiratory diseases.

MATERIALS AND METHODS: A retrospective review was done for 810 patients hospitalized with respiratory diseases in King Abdulaziz University Hospital, Jeddah, Saudi Arabia, over 5 years (January 1996 to December 2000). A special form was used to collect information from patient medical records including demographic data (such as age, sex and nationality), discharge diagnosis with other associated diseases and length of stay during hospitalization.

RESULTS: Fifty-five percent of patients were males and 56.3% were Saudis. The mostly affected age group was 46-65 years (41.8%). Asthma (38.6%), chronic obstructive pulmonary disease (COPD) (17.2%), pneumonia (11.5%), lung cancer (8.4%) and tuberculosis (TB) (7.2%) had the highest prevalence among hospitalized patients. Asthma was higher among females (63.3%) than males (36.7%). In contrast, lung cancer, COPD and TB were higher among males (88.2, 66.9 and 74.1%) than females (11.8, 33.1 and 25.9%) respectively (P <0.001). The mostly affected age groups among asthma and TB were 26-45 years and 46-65 years respectively, while the mostly affected age group in lung cancer and COPD patients was 46-65 years (P<0.001). Diabetes mellitus (22.8%) and hypertension (15.1%) were the most prevalent associated diseases. In 75% of the patients, the length of stay ranged from 1-7 and 8-14 days.

CONCLUSION: Asthma, COPD and pneumonia were the leading causes of hospitalization among patients with respiratory disorders, while diabetes and hypertension were the most commonly associated diseases.

Key words:

Asthma, chronic obstructive pulmonary disease, hospitalization, lung cancer, pneumonia, prevalence, pulmonary tuberculosis, respiratory disease

R espiratory disease has a major effect on morbidity and mortality at all ages. Chronic respiratory diseases represent a public health challenge in both industrialized and developing countries because of their frequency and economic impact.[1,2] The prevalence of respiratory diseases in developing countries is unknown. Respiratory diseases were the third leading cause of hospitalization and death, after cardiovascular disease and cancer among Canadians in 1998-1999.[3] Among respiratory diseases, lung cancer, influenza, pneumonia, asthma and chronic obstructive pulmonary disease (COPD) were the primary diagnosis for 13% of men and 11% for women in all hospitalizations.[3] In the United Kingdom (UK), respiratory diseases were responsible for 6.5% of all hospital admissions in 1991-1992.[4] In the United States, respiratory diseases were the fourth leading cause of disabilities among persons aged 15 years or older in 1991-1992.[5] In the Kingdom of Saudi Arabia (KSA), the prevalence and the pattern of respiratory

diseases in our patients, whether hospitalized or visiting outpatients' clinics either in the private or in the governmental hospitals, is unknown. Therefore, the objectives of this study were-to determine the most prevalent respiratory disorders among patients hospitalized with respiratory diseases; to assess which medical disorders were commonly associated with respiratory diseases; to correlate the distribution of respiratory diseases among hospitalized patients by age, sex and nationality; and to assess the mean length of stay in hospital with different respiratory diseases.

Materials and Methods

Study setting and population
A retrospective record review was done for all patients hospitalized and diagnosed with respiratory disorder in the medical ward of the King Abdulaziz University Hospital (KAUH) over a 5-year period starting from January 1996 up to the end of December 2000. KAUH is a

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central teaching hospital serving the population of the western region of the KSA with total capacity of 800 beds, 250 of which are allocated for the medical ward.

Data collection

A structured abstract form was used to collect information from patients' medical records, including demographic data (such as age, sex and nationality), discharge diagnosis with other associated diseases and the length of stay during hospitalization.

Statistical analysis

Data were entered and analyzed using SPSS package (Release 10.01, 1999, Chicago, IL, USA). Descriptive statistics were performed as appropriate, including frequencies for variables, mean ± standard deviation and cross tabulations. Statistical significance was set at <0.05 throughout the analysis.

Results

Records of 810 patients with diagnosed respiratory disorders were reviewed, comprising 14.5% of hospital patients to the medical ward at KAUH during the 5-year study period. Of these patients, 55% were males and 56.3% were Saudis. The age group 46-65 years had the highest prevalence (41.8%), followed by the age groups 26-45 years (27%) and 'above 65 years' (22.3%). The least age group affected was 13-25 years (9.0%). Table 1 shows ranking of diagnoses among the hospitalized patients with respiratory disorders. By far, asthma had the highest prevalence (38.6%), followed by COPD (17.2%), pneumonia (11.5%), lung cancer (8.4%) and pulmonary tuberculosis (TB) (7.2%). Figures 1-3 show the distribution of the 10 most prevalent pulmonary diagnoses encountered by age group, sex and nationality respectively. Asthma was more prevalent among females (63.3%) than males (36.7%) ($P<0.001$). In contrast, lung cancer, COPD and TB were more prevalent than among males (88.2, 66.9 and 74.1%) than females (11.8, 33.1 and 25.9%) respectively

($P<0.001$). Asthma, pneumonia and bronchopneumonia were more prevalent among Saudis, while TB was more prevalent among non-Saudis ($P<0.001$). The mostly affected age groups among asthma and TB patients were 26-45 years and 46-65 years respectively, while the mostly affected age group in lung cancer and COPD patients was 46-65 years. However, pneumonia was almost equally prevalent among all age groups ($P<0.001$). Table 2 shows the distribution of hospitalized respiratory disease patients with any associated condition. Two hundred seventy-two patients (33.6%) had one or more associated disease(s). The 10 most frequent diseases as an associated condition among respiratory disease patients are shown in Table 3. By far, diabetes mellitus (22.8%) and hypertension (15.1%) were the most prevalent associated diseases. Cardiovascular conditions such as ischemic heart disease, congestive heart failure and cor pulmonale account for a good proportion (20.7%) as an associated condition. In two-thirds or more of the patients with the most frequent respiratory disease, the length of stay ranged from 1-7 and 8-14 days. Majority of the patients with pneumonia (86%) stayed for between 1 and 2 weeks. Only 12.8% of asthmatics stayed for more than 2 weeks, while a greater proportion of patients with COPD (21%), lung cancer (23.1%), bronchiectasis (25%), pleural effusion 20% and TB 22.6% stayed for more than 2 weeks [Figure 4]. However the highest proportion was among patients with interstitial lung disease (ILD) (30%).

Discussion

This is a retrospective study in which the total number of patients hospitalized with respiratory diseases to a university hospital from 1996 to 2000 has been analyzed. The main findings were as follows: 1) The most prevalent respiratory diseases were bronchial asthma (38.6%), followed by COPD (17.2%), pneumonia (11.5%), lung cancer (8.4%) and TB (7.2%). 2) The highest prevalence of respiratory diseases was among the age group 46-65 years (41.8%), followed by age group 26-45 years (27%). 3) Diabetes mellitus (22.8%) and hypertension

Table 1: Rankings of the most prevalent diagnoses among the hospitalized patients with respiratory disorders

Diagnosis	Frequency	%
Bronchial asthma	313	38.6
COPD	139	17.2
Pneumonia	93	11.5
Lung cancer	68	8.4
Pulmonary tuberculosis	58	7.2
Pleural effusion	35	4.3
ILD/IPF	31	3.8
Bronchopneumonia	20	2.5
Bronchiectasis	14	1.7
Pulmonary embolism	8	1.0
Sleep apnea syndrome	8	1.0
Sarcoidosis	6	0.7
Pneumothorax	5	0.6
Lung abscess	4	0.5
Kyphoscoliosis	2	0.2
Extrinsic allergic alveolitis	2	0.2
Stridor	2	0.2
Empyema	1	0.1
Intractable hiccup	1	0.1

COPD = chronic obstructive pulmonary disease, SLE = systemic lupus erythematosus

Table 2: Percentage of hospitalized respiratory disease patients with associated disease

Status	No.	%
No associated disease	538	66.4
One associated disease	188	23.0
Two associated diseases	69	8.5
Three associated diseases	14	2.0
Four associated diseases	1	0.1

Table 3: The ten most frequent diseases (out of 272) as an associated condition among respiratory patients

Condition	%
Diabetes mellitus	22.8
Hypertension	15.1
Chest infection	9.6
Ischemia heart disease	8.5
Congestive heart failure	7.4
Pulmonary tuberculosis	6.6
Bronchial asthma	5.5
Bronchiectasis	4.8
Cor pulmonale	4.8
COPD	3.3

(15.1%) were the most prevalent associated diseases. 4) The length of stay ranged from 1 to 2 weeks with most frequent respiratory diseases. Asthma is a serious and growing health problem worldwide. In the United States, 14.9 million persons have been estimated to have asthma.[6,7] It was responsible for about 500,000 hospitalizations, 5,000 deaths[7] and 134 million days of restricted activity a year.[8] In 1996, asthma was the 10th most common principal diagnosis in emergency department (ED) visits[7] and the 9th most frequent diagnosis in outpatient departments.[9] The rates of death, hospitalization and ED use from asthma was varying in certain age, gender, racial and ethnic groups.[8,10] Among adults, women of all races had higher rates of illness and hospitalization from asthma.[11] In Canada, the 1998/99 National Population Health Survey (NPHS) found the prevalence of physician-diagnosed asthma was 8.4% overall: 7.5% among adults and 10.7% among children and teens and was higher among adult women than men.[12,13] Between 1994/95 and 1998-99 the prevalence of physician-diagnosed asthma increased by 37% among women and by 33% among men in the 22-44 year age group and 58% among women aged from 45-64 years.[12,13] According to the NPHS asthma supplement, 5.3% of those diagnosed with asthma required hospitalization each year.[12,13] In UK, the hospital admission rate in 1999 was 9 to 9.8% in all age groups above 14.[14] In this study, asthma was found to be the 1st leading cause of hospitalizations (38.6%) among patients admitted with respiratory diseases. In common with previous studies, hospitalization rates among women (63.3%) were almost twice those of men (36.7%). The mostly affected age group was 26-45 and 46-65 years. The average length of stay was 8.8 days.[12,13]

In this study, COPD was found to be the second leading cause of hospitalizations (17.2%) among patients with respiratory disorders. Men (66.9%) were twice affected as women (33.1%) and the age group mostly involved was 46-65 years. The average length of stay in hospitalized patients was 9.6 days and was more prevalent in Saudis than non-Saudis. There was no previous database in SA or other developing countries to compare it with our findings. However, worldwide, the prevalence of COPD was more common in men (9.34/1000) than women (7.33/1000) in 1990.[15-17] In the US, the hospitalization rates for COPD have increased with age (1.66/1000) and were higher in men than women[18] and COPD has become the fourth leading cause of death among those over 45 (19,20), a pattern that reflects the cumulative effect of cigarette smoking.[21] In the UK, the average length of stay of COPD patients was 9.9 days, which was similar to ours.[22] In Canada, beginning at age of 55 years, hospitalization rates for COPD in 1998 increased steadily with age among both men and women. Rates were higher for men than women, particularly among the elderly. The average length of stay in hospital was 10.5 days, which was slightly longer than ours.[3,23]

In this study, community-acquired pneumonia (CAP) has been found to be the third leading cause of hospitalized patients with respiratory disorders. In contrast to tuberculosis (TB), it has a higher prevalence rate in women than men, in Saudis than non-Saudis and all age groups are almost equally affected. In TB, the age group most affected was 26-45 years. Therefore, TB should always be considered in the differential diagnosis of CAP, particularly in men of this age group. The
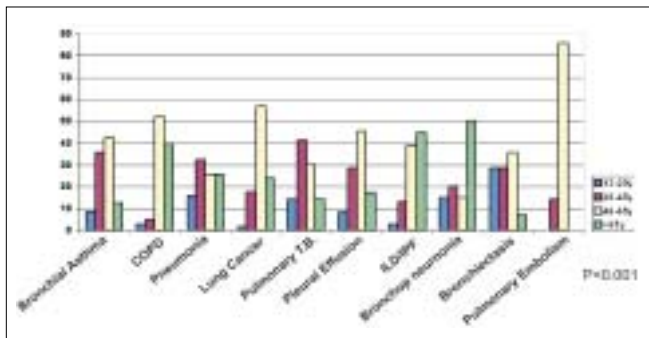

Figure 1: Distribution of the ten most frequent respiratory diseases among hospitalized patients by age group.
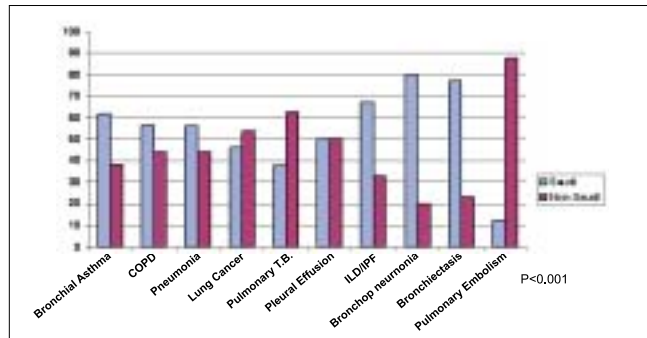

Figure 2: Distribution of the ten most frequent respiratory diseases among hospitalized patients by sex.

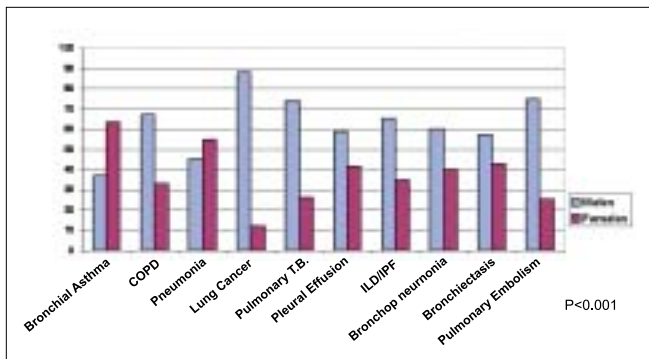**Figure 3:** Distribution of the ten most frequent respiratory diseases among hospitalized patients by nationality.
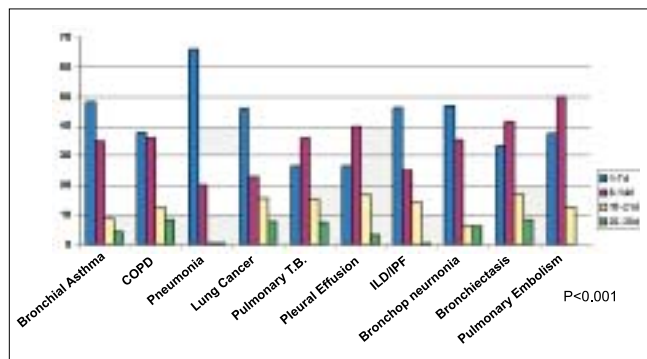

Figure 4: Length of stay of hospitalized patients suffering from the ten most frequent respiratory diseases, by age group.

higher prevalence of TB among non-Saudis may be related to the increase of international travel and immigration from TB-endemic countries. In United States, CAP affects 5.6 million adults annually and causes 1.7 million hospitalizations per year.[24] It was the sixth leading cause of death in USA and Canada.[24-26] Moreover, CAP accounted for 1 million doctor visits as well as 60,000 hospitalizations in the year 2000 in Canada.[26] Hospitalization rates have increased sharply after age 65 years. Elderly men have a much greater hospitalization rate than women.[27] TB continues to be a major worldwide health problem. In this study, it was the fifth leading cause of hospitalization. In common with our study, the largest number of reported cases of TB in Canada was among individuals aged 25-44 years in 1998.[28] In our study, lung cancer was the fourth leading cause of hospitalization in patients with respiratory disorder. The most common age group affected was 46-65 years. The higher prevalence of lung cancer (88%) and COPD (77%) among men was reflecting the trend of smoking in our people, which is at present time more common in men than women. However, the increased prevalence of smoking among women that has been observed in the past 15 years would probably affect this trend in the future. In this study, up to 30% of hospitalized patients with respiratory disorder have one or two associated diseases, in which diabetes mellitus (22.8%) and hypertension (15.1%) were the two most common. It was not clear whether respiratory diseases *per se* may or may not increase the incidence of diabetes and hypertension in the affected patient. However, the high prevalence of these diseases in our community could explain this association. Therefore, pulmonologists should be able to manage diabetes and hypertension in patients with respiratory disorders and should be aware of drugs that can be used safely in these settings. In the KSA and many developing countries, the absence of developed medical record departments even in large hospitals has hindered the analysis of discharges for important epidemiological information such as age, sex, nationality, etc. Therefore, the pattern of different diseases in general and respiratory disorders in particular was not available. This lapse was mainly due to reasons such as incomplete patients' records, shortage of statistical staff, lack of facilities and possibly, lack of supervision at all levels. Therefore, the importance of this study is due to the fact that it is the first to determine the pattern of respiratory diseases in a section of our patients over 5 years of hospitalization. However, it has some limitations - for example, it was a retrospective study in which some common diseases such as pleural effusion, bronchiectasis, ILD and pulmonary embolism were underestimated as they may have been overlooked with other principal diagnoses. In conclusion, though respiratory diseases are common problems worldwide, their prevalence, particularly in developing countries, is deficient. Such epidemiological studies are very important for clinicians and strategic health planners to improve the quality of medical management, especially in the presence of limited financial resources. Therefore, every effort should be made to improve the functioning of medical record departments.

References

1. Khaled NA, Enarson D, Bousquet J. Chronic respiratory diseases in developing countries: The burden and strategies for prevention and management. Bulletin of the World Health Organization. Print ISSN 0042-9686. Bull World Health Organ: Genebra; 2001.

2. Lopez AD. Causes of death in industrial and developing countries: Estimates for 1985-1990. Disease control priorities in developing countries. Oxford Medical Publications: Washington, DC; 1993. p. 35-50.

3. Respiratory Disease in Canada. Canadian Institute for Health Information. Canadian Lung Association. Health Canada: Statistics Canada; 2001. p. 1-102. http://www.phac-aspc.gc.ca/publicat/rdc-mrc01/index.html

4. The burden of respiratory disease. Lungand Asthma Information Agency, Department of Public Health Sciences. St. George's Hospital Medical School, Cranmer Terrace, London SW17 ORE. Factsheet 95/3. http://www.laia.ac.uk/95_3/95_3.htm. 1995

5. CDC. Prevalence of disability and associated health conditions-United States, 1991-1992. MMWR 1994;43:730-9.

6. Healthy People 2010. Respiratory Diseases. Centers for Disease Control and Prevention. National Institutes of Health. p. 1-25. http://www.healthypeople.gov/Document/HTML/Volume2/24Respiratory.htm

7. National Heart, Lung and Blood Institute (NHLBI). Data FactSheet. Asthma Statistics. National Institutes of Health (NIH), Public Health Service (PHS): Bethesda, MD; 1999.

8. National Center for Health Statistics (NCHS). Current estimates from the National Health Interview Survey, Vital and Health Statistics: 1997. p. 194.

9. NCHS. Ambulatory care visits to physician's offices, hospital outpatients departments and emergency departments: United States 1996. Vital and Health Statistics 1998;13:134.

10. Mannino DM, Homa DM, Pertowski CA, Ashizawa A, Nixon LL, Johnson CA, *et al.* Surveillance for asthma-United States, 1960-1995. MMRW CDC Surveill Summ 1998;47:1-27.

11. Department of Health and Human Services (HHS). Action Against Asthma: A Strategic Plan for the Department of Health and Human Services. HHS: Washington DC; 2000.

12. World Health Organization. Global initiative for asthma: Global strategy for asthma management and prevention HNLBI/WHO workshop report. National Institutes of Health: 1995. p. 26-32.

13. Millar WJ, Hill GB. Childhood asthma. Health Reports. Winter: Statistics Canada; 1998. p. 10.

14. Trends in hospital admissions and deaths from asthma. Lungand Asthma Information Agency, Department of Public Health Sciences. St. George's Hospital Medical School, Cranmer Terrace, London SW17 ORE. Factsheet 2002/1. http://www.laia.ac.uk/2002_1/2002_1.htm

15. Chen JC, Mannino MD. Worldwide epidemiology of chronic obstructive pulmonary disease. Curr Opin Pulm Med 1999;5:93-9.

16. Ferguson GT, Cherniack RM. Management of chronic obstructive pulmonary disease. N Engl J Med 1993;328:1017-22.

17. Murray CJL, Lopez AD. The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Harvard University Press: Cambridge, MA; 1996.

18. National Centre for Health Statistics. National hospital interview survey. Vital and health statistics. National hospital interview survey. Vital and Health Statistics, Series 10 (issues from 1974 to 1995).

19. National Heart, Lung and Blood Institute. Morbidity and mortality: chartbook on cardiovascular, lung and blood diseases. US Department of Health and Human Services, Public Health Service, National Institutes of Health: Bethesda, MD; 1998. Available from: URL: www.nhlbi.nih.gov/nhlblbi/seiin/other/cht-book/htm

20. National Heart, Lung and Blood Institute. Morbidity and

Mortality; 2002 Chartbook on Cardiovascular, Lung and Blood Diseases. U.S. Department of Health and Human Services, NIH, NHLBI: Bethesda, Maryland; 2002. http://www.nhlbi.nih.gov/resources/docs/02_chtbk.pdf.

21. Renzetti AD, McClement JH, Litt BD. The Veterans Administration Cooperative Study of Pulmonary Function. 111: Mortality in relation to respiratory function in chronic obstructive pulmonary disease. Am J Med 1966;41:115-29.

22. Office of National Statistics. Mortality statistics (revised) 1994, England and Wales. Her Majesty's Stationary Office: London; 1996.

23. Petty TL. Strategies in preserving lung health and preventing COPD and associated diseases: The National Ling Health Education Program (NLHELP). Chest 1998;113:136S-52S.

24. Mandell LA. Community – acquired pneumonia: Etiology, epidemiology and treatment. Chest 1995;108:5S-42S.

25. Helwig D. Major cost reductions reported in Canadian pneumonia study. eCMAJ Today. February 9, 2000. http://epe.lacbac.gc.ca/100/201/300/cdn_medical_association/cmaj/cmaj_today/2000/02_09.htm

26. Statistics Canada. Selected leading causes of death, by sex: 1997. URL: Http://www.statcan.ca/english/Pgdb/ People/Health/health36.htm.

27. Marrie TJ. Community-acquired pneumonia: Epidemiology, etiology, treatment. Infect Dis Clin North Am 1998;12:3:723-40.

28. Archibald C, Yan P, Njoo H. HIV and TB co infection in Canada: The view through the AIDS window. Canadian Conference on HIV/AIDS Research, Ottawa, May 1997. Can J Inf Dis 1997;8:28A.

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